33. The [invention] silicon chip recited in claim 32, wherein the surface region sensor is made of a single metal.

34. The [invention] silicon chip recited in claim 32, wherein the surface region sensor is made of [different] a plurality of metals.

35. The [invention] silicon chip recited in claim 32, wherein the surface region sensor forms a protein-specific receptor.

36. The [invention] silicon chip recited in claim 32, wherein the surface region sensor [is made from] has a structure constructed using information derived from x-ray diffraction studies.

37. The [invention] silicon chip recited in claim 32, wherein the surface region sensor [is made from] has a structure constructed using information derived from nuclear magnetic resonance studies.

REMARKS

Applicant would like to thank the examiner for the thorough review of the art and the comments on the claims. The claims have been amended to address the 112 objections and to clarify the invention in light of the prior art. The specification has been amended to clarify the dimensions of the nanoelectrodes. No new matter has been added.

Referring to the first art rejection, Claims 32-35 stand rejected over *Lipskier*. *Lipskier*, however, provides a "molecular fingerprint" material of the type in which an organic polymer is cross-linked in the presence of a molecular species to form cavities adapted to selectively capture the subject material. In effect, the polymer cross-links around the subject molecule which is leached out to form the cavities. The electrodes shown in the *Lipskier* reference form a "volume wave transducer" i.e. "comprising a piezoelectric material inserted between two electrodes, at least one of the electrodes being coated with sensitive layer." [Col. 2.] The electrodes are not "nanoelectrodes"; that is, they are orders of magnitude larger than those of the present invention. Although the overall objective of *Lipskier* is similar to the claimed invention, the use of a molecular fingerprint for analyte capture is entirely different than the present invention, which in claim 1 as now amended provides:

> 1. (As amended) A sensor for detecting biological molecules, said sensor comprising:
>
> a substrate;
>
> an electrode on said substrate, said electrode having the capacity to bind a preselected biological molecule, said electrode extending from a principal surface of said substrate a distance of from 2 Angstroms to 5 nanometers and said electrode having a width of from 2 Angstroms to 5 nanometers.

Reconsideration and allowance are respectfully requested.

Turning then to the rejection of Claims 1-13, 16-18, 25, 26 and 29-31 over *Nakagawa* and *Zhang*, *Nakagawa* does not have electrodes extending from the surface of the sensor substrate. The "electrode" in *Nakagawa* is the probe of the scanning probe microscope. *Nakagawa* describes a variation of the use of Atomic Force Microscopy (AFM) or Scanning Tunneling Microscopy (STM) for the detection of a sample such as a biological molecule. What *Nakagawa* shows is that standard STM or AFM microtips (also called probes) can be coated with specific molecules in order to create specific interactions with a surface containing the sample or molecule to measure. Such interactions can be measured with atomic level precision. Indeed it is well known that the lateral resolution of an AFM or STM probe is in the order of 1 Angstrom or less. Using the *Nakagawa* technology, a bulky AFM or STM machine (and associated hardware) must be used each time a new measurement is made. The detection must come from the top, and cannot come from the chip itself (*Nakagawa*, Fig. 6). There is virtually no similarity between *Nakagawa* and the present invention as now claimed. Applicant submits that *Zhang* could not be used to modify *Nakagawa* in the manner suggested by the Examiner. The present invention is simply not an atomic force microscopy probe. Although the tips of AFMs are quite small, they are far larger than the claimed invention. *Zhang* does not teach placing nanoelectrodes of Applicant's dimensions on a sensor substrate nor does it apparently deal with detecting biological molecules. Even if an AFM probe could be made within *Zhang*'s dimensions, it still would not remotely resemble the present invention.

With respect to the rejection of Claims 14, 15 and 22-24 over *Nakagawa* in light of *Zhang*, *Costa-Kramer* and *Hajme*, again, there would be no motivation (or feasibility) to so modify *Nakagawa's* AFM as discussed above.

Finally, with respect to Claims 36 and 37, as stated above, *Lipskier* provides a fundamentally different technology and would not be transformed to the present invention by the modification which the Examiner suggests the secondary references support.

Reconsideration and allowance are respectfully requested.

Respectfully submitted,

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CERTIFICATE OF MAILING (37 C.F.R. § 1.8(a)

I hereby certify that the foregoing Amendment is being deposited with the United States Postal Service, with sufficient postage as first class mail, in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231, on this 24 day of September, 1999.

Donna Crumit

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